SCIENTIFIC SERIALS.

THE *Journal of Botany* continues, in its numbers for April, May, and June, Mr. J. G. Baker's Synopsis of the Tillandsieæ, and MM. Britten and Boulger's valuable biographical index of British and Irish botanists (deceased).—Students of diatoms will be interested in Mr. J. Rattray's paper on *Aulacodiscus*, in which the many and singular abnormalities of this genus of fossil diatoms are described and illustrated by a plate.—Mr. G. Massee contributes a revision of the genus *Bovista*, in which several new species of this genus of Fungi are described, also illustrated by a plate.—We have also biographies of Prof. Asa Gray, and Mr. John Smith, of Kew (the portrait of the former is not a pleasing one), and several papers on local or descriptive botany.

IN the *Botanical Gazette* for February, March, and April, we have no important papers of original research or observation such as sometimes reach us in this record of the doings of botanists in the Far West (published at Crawfordsville, Indiana). The original papers in these numbers relate almost entirely to the distribution of plants in the Western States of America, and to the description of American species.

THE number of the *Nuovo Giornale Botanico Italiano* for April contains the conclusion of Prof. A. N. Berlese's monograph of the genera of Fungi *Pleospora*, *Clathrospora*, and *Pyrenophora*, with the ten coloured plates which serve to illustrate the whole paper; and a description by Sig. C. Massalongo of a number of instances of teratology, chiefly relating to the flower. It serves further as the medium of publication of the proceedings of the Italian Botanical Society, reports being appended of a number of smaller contributions in various departments of botany.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 21.—"Muscular Movements in Man, and their Evolution in the Infant: a Study of Movement in Man, and its Evolution, together with Inferences as to the Properties of Nerve-centres and their Modes of Action in expressing Thought." By Francis Warner, M.D., F.R.C.P., Physician to the London Hospital, and Lecturer on Botany in the London Hospital Medical College. Communicated by Prof. J. Hutchinson, F.R.S.

Before proceeding to give an account of the visible evolution of voluntary movement in man, it is necessary to define the different classes of movements seen, indicating the criteria by which the observer may be guided in the examples before him.

The new-born infant presents constant movement in all its parts while it is awake, and this is not controlled by impressions from without. Graphic tracings of such movements are given This spontaneous movement in the infant appears to be of great physiological importance, and is here termed "microkinesis." It is argued that the mode of brain action which produces microkinesis is analogous to the action producing spontaneous movements in all young animals, and to the modes of cell-growth which produce circumnutation in young seedling plants. It is argued that as circumnutation becomes modified by external forces to the modes of movement termed heliotropism, geotropism, &c., so microkinesis in the infant is replaced by the more complicated modes of brain action as evolution proceeds.

The conditions of movement are then described, as seen at successive stages of development of the child, and it is shown that they become less spontaneous, and more under control of stimuli acting upon the child from without, while the phenomena termed memory and imitation are evolved.

From observations made, two hypotheses are put forward. It is suggested that when a well co-ordinated movement follows a slight stimulus, the impression produces temporary unions among the centres, preparing them for the special combinations and series of actions which are seen to follow. Such unions among nerve-centres appear to be formed when a period of cerebral inhibition, produced by a word of command, is seen to be followed by a co-ordinated series of acts. A graphic tracing indicating suspension of microkinesis to the stimulus of sight and sound is given. It is further suggested that the brain action corresponding to thought is the formation of functional unions among cells, whose outcome is seen in the movements which express the thought, or its physical representation. Properties similar to those described in brain-centres may be illustrated in modes of growth.

"Evaporation and Dissociation. Part VIII. A Study of the Thermal Properties of Propyl Alcohol." By William Ramsay, Ph.D., F.R.S., and Sydney Young, D.Sc.

In continuation of our investigations of thermal properties of pure liquids, we have now determined the vapour-pressures, vapour-densities, and expansion in the liquid and gaseous states of propyl alcohol, and from these results we have calculated the heats of vaporization at definite temperatures. The compressibility of the liquid has also been measured. The range of temperature is from 5° to 280° C., and the range of pressure from 5 mm. to 56,000 mm.

The memoir contains an account of the purification of the propyl alcohol; determinations of its specific gravity at 0°, and at 10°·72; and of the constants mentioned above.

The approximate critical temperature of propyl alcohol is 263°·7; the approximate critical pressure is 38,120 mm., and the approximate volume of 1 gramme is 3·6 c.c. The first two of these constants must be very nearly correct; the third cannot be determined with the same degree of precision.

The memoir is accompanied by plates, showing the relations of volume, temperature, and pressure in a graphic form.

Royal Meteorological Society, June 20.—Dr. W. Marcet, F.R.S., President, in the chair.—The following papers were read:—First Report of the Thunderstorm Committee. This Report deals with the photographs of lightning-flashes, some sixty in number, which have been received by the Society. From the evidence now obtained it appears that lightning assumes various typical forms, under conditions which are at present unknown. The Committee consider that the lightning-flashes may be arranged under the following types: (1) stream, (2) sinuous, (3) ramified, (4) meandering, (5) beaded or chapletted, and (6) ribbon lightning. In one of the photographs there is a *dark* flash of the same character as the bright flashes, but the Committee defer offering any explanation of the same until they get further examples of dark flashes. As the thunderstorm season is now coming on, the Committee propose to publish their Report at once, along with some reproductions of the photographs by the autotype process, in order that observers may be prepared to notice the various forms of lightning.—The cold period from September 1887 to May 1888, by Mr. C. Harding. The mean temperature for each of the nine months from September 1887 to May 1888 was below the average, whilst in the case of October there has been no corresponding month as cold during the last half century, and only three colder Aprils. In London the mean temperature for the period was only 42°·4, and there has been no similarly low mean for the corresponding period since 1854-55, which will be remembered as the time of the Crimean War, and only three equally cold periods during the last 50 years. The temperature of the soil at Greenwich at 3 feet below the surface was below the average in each month from October to April; in October and April the temperature at this depth was the coldest on record, observations being available for the last 42 years, and in November it was the coldest for 37 years.—Observations on cloud movements near the equator; and on the general character of the weather in the "Doldrums," by Hon. R. Abercromby. The author gives the results of observations made during four voyages across the equator and the "Doldrums," with special reference to the motion of clouds at various levels. Two voyages were across the Indian Ocean during the season of the north-west monsoon, and two across the Atlantic in the months of July and December. The nature of the general circulation of the atmosphere near the "Doldrums" is discussed as regards the theory that the Trades, after meeting, rise and fall back on themselves; or, according to the suggestion of Maury, that the Trades interlace and cross the equator; or, as following the analogy of Dr. Vettin's experiments on smoke. It is shown that the materials at present available are insufficient to form a definite conclusion, but details are given of the general character of the weather and of the squalls in the "Doldrums," with a view of showing what kind of observations are required to solve this important problem. The old idea of a deep Trade—with a high opposite current flowing overhead—is certainly erroneous; for there is always a regular vertical succession of the upper currents as we ascend, according to the hemisphere.

Zoological Society, June 19.—Prof. Flower, F.R.S., President, in the chair.—A letter was read addressed to the President by Dr. Emin Pasha, dated Tunguru Island (Lake Albert), October 31, 1887, announcing the despatch of further collections of natural history objects, and promising for the

Society some notes on European migratory birds observed in that country.—An extract was read from a letter addressed by Mr. E. L. Layard to Mr. John Ponsonby concerning the occurrence of a West Indian Land-Shell (*Stenogyra octona*) in New Caledonia.—Mr. Tegetmeier exhibited and made remarks on the feet of an Australian Rabbit, supposed to have acquired arboreal habits.—Prof. Bell exhibited and made remarks on a specimen of a tube-forming Actonian (*Cerianthus membranaceus*) in its tube; obtained by Mr. John Murray at a depth of 70 fathoms in Loch Etive.—A communication was read from Prof. W. Newton Parker, on the poison-glands of the fishes of the genus *Trachinus*. This paper showed the existence of glands in connection with the grooved dorsal and opercular spines of the two British species of Weever. The glands were stated to be composed of large granular nucleated cells, which are continuous with those of the epidermis. An account of the observations of previous authors, both as regards the structure and physiology of the poison-organs of these fishes, was also given.—A communication was read from Mr. H. W. Bates, F.R.S., containing the description of a collection of Coleoptera made by Mr. J. H. Leech, during a recent visit to the eastern side of the Corean Peninsula.—A second communication from Mr. Bates treated of some new species of Coleoptera of the families Cicindelidæ and Carabidæ from the valley of the Yang-tsze-Kiang, China.—Mr. J. B. Sutton read a paper on some abnormalities occurring among animals recently living in the Society's Gardens.—Prof. Bell read an account of a collection of Echinoderms made at Tuticorin, Madras, by Mr. Edgar Thurston, Superintendent of the Government Central Museum, Madras.—A communication was read from Mr. F. Moore, containing the second portion of a list of the Lepidoptera collected by the Rev. J. H. Hocking, chiefly in the Kangra District of the North-Western Himalayas. The present paper contained the descriptions of seven new genera and of forty-eight new species. An account of the transformations of a number of these species was also given from Mr. Hocking's notes.

Geological Society, June 20.—Dr. W. T. Blanford, F.R.S., President, in the chair.—The following communications were read:—On the occurrence of marine fossils in the Coal-measures of Fife, by Jas. W. Kirkby; communicated by Prof. T. Rupert Jones, F.R.S.—Directions of ice-flow in the North of Ireland, as determined by the observations of the Geological Survey, by J. R. Kilroe; communicated by Prof. E. Hull, F.R.S.—Evidence of ice-action in Carboniferous times, by John Spencer.—The Greensand bed at the base of the Thanet sand, by Miss Margaret I. Gardiner, Bathurst Student, Newnham College, Cambridge; communicated by J. J. H. Teall.—On the occurrence of *Elephas meridionalis* at Dewlish, Dorset, by the Rev. O. Fisher.—On perlitic felsites, probably of Archæan age, from the flanks of the Herefordshire Beacon, and on the possible origin of some epidosites, by Frank Rutley. The author has previously described a rock from this locality in which faint indications of a perlitic structure were discernible. In the present paper additional instances were enumerated and a description was given. The perlitic structure is difficult to recognize, owing to subsequent alteration of the rock. Decomposition-products, apparently chiefly epidote, with possibly a little kaolin, have been found in great part within the minute fissures and perlitic cracks. The author suggested, from his observations, that felsites, resulting from the devitrification of obsidian, quartz-felsites, aplites, &c., may, by the decomposition of the felspathic constituents, pass, in the first instance, into rocks composed essentially of quartz and kaolin; and that by subsequent alteration of the kaolin by the action of water charged with bicarbonate of lime and more or less carbonate of iron in solution, these may eventually be converted into epidosites. He regarded it as probable that the rocks are of later Archæan or Cambrian age.—The ejected blocks of Monte Somma, Part I., stratified limestones, by Dr. H. J. Johnston-Lavis.

Palæontographical Society, June 22.—Annual Meeting.—Dr. H. Woodward, F.R.S., Vice-President, in the chair.—The Report of the Council, presented by the Secretary, Prof. Wiltshire, stated that since the date of the last annual meeting the volume for 1887 had been issued, and that the volume for the present year was in progress. It would contain the following parts of monographs: the Stromatoporoids, Part II., by Prof. Alleyne Nicholson; the Cretaceous Echinodermata, Part I., by Mr. W. P. Sladen; the Jurassic Gasteropoda, Part III., by Mr. W. H. Hudleston; the Inferior Oolite Ammonites, Part II., by Mr. S. S. Buckman. It was stated that the arrangement by which members had been enabled to procure parts of finished monographs as well as the complete monographs, distinct from the annual volumes, had been found to work very efficiently. It was further stated that the financial position of the Society was much better than on the previous occasion. This was due in part to a grant of £50 made by the General Committee of the British Association at the Manchester meeting, and in part to the very considerable increase in the number of subscribers, which had resulted from the efforts made during the past and preceding year to bring before geologists, palæontologists, and all interested in science, the work which was carried on by the Society. If the present improvement could be maintained, there need be no fears for the future.—Sir R. Owen was re-elected President; Mr. Etheridge, Treasurer; and Prof. Wiltshire Secretary. Messrs. W. E. Balston, C. J. A. Meyer, G. H. Morton, and W. P. Sladen were elected members of the Council, in the place of Messrs. S. S. Buckman, J. Evans, C. H. Gatty, and W. C. Lucy, who retire by rotation.

PARIS.

Academy of Sciences, June 25.—M. Janssen, President, in the chair.—On the canals of the planet Mars, by M. Fizeau. The various circumstances connected with these appearances, as lately described by MM. Perrotin and Schiaparelli, suggest a strong analogy with certain phenomena of glaciation—parallel ridges, crevasses, rectilinear fissures often of great length and at various angles—observed in the regions of large glaciers in Switzerland and especially in Greenland. This leads to the hypothesis of a vast development of glaciation on the surface of Mars, where, the seasons being relatively longer and the temperature much lower, the conditions must also be more favourable than on the earth for these manifestations. The reading of the paper was followed by some remarks by M. J. Janssen, who gave a guarded assent to M. Fizeau's "very ingenious and very beautiful" theory.—On the vapour-density of the chloride of aluminium, and on the molecular weight of this body, by MM C. Friedel and J. M. Crafts. The recent experiments of MM. Nilson and Pettersson tended to show that this substance should receive the formula $AlCl_3$ rather than the double formula Al_2Cl_6 proposed by MM. Sainte-Claire and Troost. The fresh researches of MM. Friedel and Crafts, undertaken to settle the point, lead to the conclusion that the density corresponds to Al_2Cl_6, which would accordingly represent the molecular weight of the chloride of aluminium. The experiments of MM. Louise and Roux on methyl and ethyl aluminium are in harmony with this inference.—Progress of the Roscoff and Arago Laboratories, by M. de Lacaze-Duthiers. Both of these important biological stations have lately been inspected by the author, who is able to speak most favourably of their present state. Zoologists will find concentrated at Banyuls during the winter and at Roscoff in summer all the conditions best adapted for the study of the lower forms of animal life.—Some remarks relative to the representation of irrational numbers by means of continuous fractions, by M. Hugo Gyldén. From the points here discussed flows a thesis of great importance connected with the convergence of certain trigonometric series employed in the calculation of perturbations. The thesis is thus worded: The probability of finding a value for a beyond a given limit is in inverse ratio to the number expressing this limit.—On the degrees of oxidation observed in the efflorescing compounds of chromium and manganese, by M. Lecoq de Boisbaudran. In this first paper on the subject the author deals mainly with the carbonate of lime in combination with an oxide of chromium (or chromate of ammonia), and highly calcined in the air. He shows that chromium produces with lime a fluorescence which seems to present no analogy with those yielded by it in combination with alumina, gallina, or magnesia.—On orthogonal substitutions and the regular divisions of space, by M. E. Goursat. The divisions here determined may be connected with the regular figures of space of four dimensions. Thus may readily be found the six regular figures discovered by Stringham. But the question may be pushed further, and, by following Poinsot's method, in space of four dimensions the existence may be shown of regular figures analogous to the regular starred polyhedrons of space of three dimensions. These results, here merely indicated, will be fully developed in a memoir which will shortly be published.—On a theorem of Kummer, by M. E. Cesaro. This is in connection with a recent paper by M. Jensen, who is stated to defend himself from inaccuracies of which he was not accused. In the author's communication of April 16, nothing was questioned except the *novelty* of M. Jensen's theorem, which does not differ essentially from that of Kummer, as modified and completed by Dini in 1867.—On the hydrochlorates of trichloride of antimony, of trichloride of bismuth, and of pentachloride of antimony, by M. Engel. The researches here described fully confirm the existence of these bodies, which are described as well-defined salts that may be easily isolated. Like all the other hydrochlorates of chloride hitherto prepared, they all contain water of crystallization, and there are in each case at least two molecules of water for each molecule of hydrochloric acid fixed by the chloride. —On the reproduction of phenacite and the emerald, by MM. P. Hautefeuille and A. Perrey. The conditions are described under which the authors have effected the synthesis of two substances whose properties are identical with those of natural phenacite and the emerald. The analysis of the artificial emerald yielded silica 67·7, alumina 19·6, and glucine 13·4, which are nearer to the calculated proportions than those given for the composition of most natural emeralds. The analyzed crystals, whose density was 2·67, were colourless; but greenish-yellow and green crystals were easily obtained—the former by the oxide of iron, the latter by the oxide of chromium.

BERLIN.

Physiological Society, June 8.—Prof. du Bois-Reymond, President, in the chair.—Prof. Kossel spoke on a new constituent of tea. Inasmuch as the presence of caffein in tea does not suffice to explain its physiological action, he had examined it for other bases, and found in the leaves of tea, in addition to adenin, a new well-characterized base whose composition is $C_7H_8N_4O_2$, to which he has given the name of theophyllin. Theobromin and paraxanthin have the same chemical composition as theophyllin, but the latter differs from the former by a series of well-marked chemical reactions. One question of special interest was as to the constitution of the new base, which belongs to that class of substances known as the xanthin-bodies. Fischer has shown that xanthin yields alloxan and urea when oxidized; and, similarly, it is known that theobromin is dimethylxanthin, yielding, by oxidation, methylalloxan and methylurea; as also that caffein is trimethylxanthin, yielding, by oxidation, dimethylalloxan and monomethylurea. The question hence arose as to the constitution of the new base, which, since it is isomeric with theobromin, is also presumably a dimethylxanthin. Since the speaker was in possession of so limited a quantity of the substance that he could not proceed to oxidize it, he proceeded by a different method, and introduced a methyl group into the molecule of theophyllin: on performing this experiment he obtained caffein, from which it must be concluded that theophyllin contains one methyl group united to a residue of urea, and one to a residue of alloxan, and has therefore a constitution identical with that of theobromin. It still remains to investigate the physiological action of the new base.—Dr. Will spoke on the alkaloids of the Solanaceæ, of which at present only atropin, hyoscyamin, and hyoscin are known as distinct substances with reference to their mydriatic action. The first two of the above are of special interest, as possessing the same chemical composition ($C_{17}H_{23}NO_3$), but differing as regards their melting-point, the salts which they form with gold, and their specific rotatory powers. It had been noticed long ago that sometimes much atropin and but little hyoscyamin, and, *vice versâ*, much hyoscyamin and but little atropin, is obtained from the roots of Belladonna. This difference in the relative amounts of the two substances obtained was noticed when portions of the same sample of roots were treated in the same way; as the result of which the chemical factory of Schering had requested the speaker to investigate the cause of this difference in the relative amounts of the several products. The first fact which he determined was, that when hyoscyamin is heated to 109° C.—that is to say, to a temperature slightly above its melting-point—it changes into atropin. This is, however, of no significance in the preparation of the alkaloids, as carried on in a factory, inasmuch as no such temperatures are employed. Dr. Will further found that, when a few drops of alkali are added to a solution of hyoscyamin which possesses strong rotatory powers, in a few hours the rotatory power is lost, and the solution no longer contains hyoscyamin, but atropin. According to this, during the extraction of Belladonna roots in the factory, the amount of hyoscyamin which may have become converted into atropin is dependent upon the time of action and the concentration of the alkaline solution employed in the process: by treatment with alkali, the whole of the hyoscyamin can always be converted into atropin. The fact that, by the extraction of the roots of Hyoscyamus, only hyoscyamin and no atropin is obtained, was explained by the speaker as being due to the employment of ammonia in the process, which has only a feeble power of converting the one alkaloid into the other. The speaker intends to employ this conversion of hyoscyamin into atropin, which is measurable by means of change in rotatory power, to the determination of the combining affinities of the alkalies. Dr. Will is inclined to believe that relations similar to the above exist in the case of quinine and cinchonine, which are also obtained in varying relative amounts from the bark.—Dr. Koenig gave an account of some experiments, undertaken at his suggestion by Isaacksen, with a view to testing Holmgren's statement that very small coloured dots can only be seen as one of the primary colours of the Young-Helmholtz theory—namely, red, green, or violet. This statement was not, however, confirmed when the necessary precautions were taken, and it was found that small dots of any colour, even yellow and blue, were perceived as possessing their own objective colour; this had also been observed by Hering. Isaacksen had, further, investigated the power which the eye possesses of distinguishing between minute dot-like lights which are so small that their image on the retina only falls on one cone, and found that it was as fully developed as for the colours of large surfaces.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Chemical Problems: Grabfield and Burns (Heath, Boston).—The Movements of Respiration and their Innervation in the Rabbit: Dr. M. Marckwald, translated (Blackie).—Natural History and Epidemiology of Cholera: Sir J. Fayrer (Churchill).—The Photographer's Note-book and Index: Sir D. Salomons (Marion).—Short Lectures to Electrical Artisans: J. A. Fleming, second edition (Spon).—Whence comes Man; From Nature or from God?: A. J. Bell (Isbister).—*Challenger* Expedition Report, vols. xxiii., xxiv. 2 Parts, and xxv., Zoology (Eyre and Spottiswoode).—Annual Report of the Geological and Natural History Survey of Canada, vol. ii. 1886 (Dawson, Montreal).—Another World, or the Fourth Dimension: A. T. Schofield (Sonnenschein).—Changes of Level of the Great Lakes: J. K. Gilbert (Washington).—The Construction and Maintenance of School Infirmaries and Sanatoria (Churchill).—Electricity *versus* Gas: J. Stent (Sonnenschein).—Annalen der Physik und Chemie, 1888, No. 8*a* (Leipzig).

CONTENTS. PAGE

The Decadence of the Chemical Profession in Government Opinion 217
The Land and Fresh-water Mollusca of India . . . 217
Recent Mathematical Books 218
The Botany of the Afghan Delimitation Commission 219
Our Book Shelf:—
  Wrightson: "The Principles of Agricultural Practice as an Instructional Subject" 220
  Edwards-Moss: "A Season in Sutherland" 220
Letters to the Editor:—
  "Sky-coloured Clouds" at Night.—**R. T. Omond** . 220
  Micromillimetre.—**Frank Crisp** 221
  A Prognostic of Thunder.—**B. Woodd-Smith** . . . 221
  Parasites of the Hessian Fly.—**F. E. S.** 221
  Fact and Fiction.—**Harry Napier Draper** 221
  The Nephridia of Earthworms.—**Frank E. Beddard** 221
The "Avocet" Rock. (*With a Chart.*) 222
Magnetic Strains. (*Illustrated.*) By **Shelford Bidwell, F.R.S.** 224
A Meteorologist at the Royal Academy. By Hon. **Ralph Abercromby** 225
The Oxford University Observatory 227
Notes 228
Our Astronomical Column:—
  American Observatories 231
  Minor Planets 231
  The Rings of Saturn 231
Astronomical Phenomena for the Week 1888 July 8–14 231
Electrical Notes 231
The Micro-organisms of Air and Water. (*Illustrated.*) By **Dr. Percy F. Frankland** 232
The Opening of the Marine Biological Laboratory at Plymouth 236
University and Educational Intelligence 237
Scientific Serials 238
Societies and Academies 238
Books, Pamphlets, and Serials Received 240